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Taxonomic review of the *postica*-group of *Fannia* Robineau-Desvoidy (Diptera, Fanniidae) from China, with the description of one new species

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Abstract

The Chinese fauna of the *Fannia postica*-group Chillcott (1961) is reviewed, the diagnostic features of this group are redefined, one new species, *Fannia nudifemorata* **sp. n.**, is described, and a key to the males of nine known species is given. One new junior synonym, *F. tigripeda* Xue, Wang & Li, **syn. n.** for *F. stigi* Rognes is established. To facilitate comparisons of the species, *Fannia aethiops* Malloch, *F. ardua* Nishida, *F. discoculea* Xue, *F. ringdahlana* Collin, *F. postica* (Stein), *F. spathiophora* Malloch, and *F. stigi* Rognes are redescribed and illustrated. The geographic distribution of the known Chinese species is updated.

Keywords

Diptera, Fanniidae, *Fannia*, *Fannia postica*-group, new species

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Introduction

The *Fannia postica*-group was originally established in the genus *Fannia* Robineau-Desvoidy by Chillcott (1961), consisting of two subgroups, the *F. postica*-subgroup and the *F. spathiophora*-subgroup. Fifteen species were included from the Holarctic Region (Chillcott 1961). Since then, Nishida (1975, 1976), Rognes (1982), and Xue et al. (2001) have studied the *F. postica*-group from Japan, Europe, and China, respectively, forming a sound basis for further research on this group. Rozkošný et al. (1997) listed nine European species of the *F. postica*-group and transferred *F. ringdahlana* Collin from the *F. spathiophora*-subgroup to the *F. postica*-subgroup. Gregor and Rozkošný (2005) described an additional new species of the *F. postica*-group from Slovakia. So far, twenty-two species of the *F. postica*-group are known worldwide, of which eight species belong to the *F. postica*-subgroup and the others to the *F. spathiophora*-subgroup.

Before the present contribution, eight species of the *F. postica*-group were known in China (Nishida 1975, Fan 1992, Xue and Wang 1998, Xue et al. 2001, Wang and Xue 2002, Wu and Wang 2002, Su and Wang 2004, Wang et al. 2006). In recent years we have been engaged in faunal studies of this group of flies in China, and have found one further undescribed species from the Tibetan Plateau. The purpose of this paper is to review the *F. postica*-group, describe one new species, and provide a key to the known Chinese species. Based upon the morphological characters, we also discuss the diagnostic characters of this group.

Materials and methods

The morphological terminology follows McAlpine (1981), except that we follow Stuckenberg (1999) in using "postpedicel" for first antennal flagellomere. Absolute measurements are used for body length in millimetres (mm). Abbreviations used for characters include: *a* = anterior seta, *acr* = acrostichal seta, *ad* = anterodorsal seta, *av* = anteroventral seta, *d* = dorsal seta, *dc* = dorsocentral seta, *ia* = intra-alar seta, *p* = posterior seta, *pd* = posterodorsal seta, *pra* = prealar seta, and *pv* = posteroventral seta.

Our study of the *F. postica*-group was based on an examination of specimens of *Fannia postica*, *F. ringdahlana*, *F. aethiops*, *F. ardua*, and *F. spathiophora*, and the holotypes of *F. discoculea*, *F. nudifemorata* sp. n., and *F. stigi*. Data on *F. coculea* Nishida was taken from Nishida (1975). All specimens studied in this paper, including the types of new species, are deposited in the Institute of Entomology, Shenyang Normal University, Shenyang.

Taxonomic account

Fannia postica-group

***Fannia postica*-group**: Chillcott, 1961: 101, 222; Rozkošný et al., 1997: 48.

Diagnosis. Each tibia with at most one seta on each surface; mid first tarsomere usually with basal tooth-like spines or clustered hairs on ventral surface; hind femur usually with one or numerous *av*; hind coxa bare on posterior surface (except *Fannia discoculea* and *F. coculea*); lower calypter at least leaf-like, otherwise lower calypter projecting beyond upper one; *pra* usually 2; presutural *acr* usually biserial; katepisternum without ventral spines; male cercal plate longish, the median part distinctly swollen in ventral view, the median part curving anteriorly and the apex curving posteriorly in lateral view. For detailed descriptions of the adults, see Chillcott (1961: 124).

Included species: *Fannia postica*-subgroup: *F. brevicauda* Chillcott, *F. discoculea*, *F. enigmata* Chillcott, *F. flavibasis* (Stein), *F. multisetosa* Chillcott, *F. postica*, *F. ringdahlana*, *F. sequoiae* Chillcott; *F. spathiophora*-subgroup: *F. aethiops*, *F. ardua*, *F. bigelowi* Chillcott, *F. brooksi* Chillcott, *F. coculea*, *F. gotlandica* Ringdahl, *F. nudifemorata* sp. n., *F. scyphocerca* Chillcott, *F. slovaca* Gregor & Rozkošný, *F. spathiophora*, *F. stigi*, *F. tundrarum* Chillcott, *F. umbratica* Collin, *F. umbrosa* (Stein).

Key to males of the known Chinese species of the *Fannia postica*-group

1	Hind femur at least with 2 *av* in distal half (*postica*-subgroup)	**2**
–	Hind femur only with 1 *av* in distal half (*spathiophora*-subgroup)	**4**
2	*Pra* 2; hind coxa bare on posterior surface	**3**
–	*Pra* 1; hind coxa with hairs on posterior surface	***F. discoculea***
3	Mid first tarsomere with basal tooth-like spines on ventral surface; hind femur only with 2 *av* in distal half; calypters blackish	***F. ringdahlana***
–	Mid first tarsomere without basal tooth-like spines on ventral surface; hind femur with 4–6 *av* in distal half; calypters yellow	***F. postica***
4	Hind coxa bare on posterior surface	**5**
–	Hind coxa with hairs on posterior surface; *pra* 2 (rarely 3); frontal setae 7–9; mid first tarsomere with basal tooth-like spines on ventral surface	***F. coculea***
5	Fore tibia with 7–9 long and fine *pv* hairs	***F. spathiophora***
–	Fore tibia without such hairs	**6**
6	Hind femur with *pv* in distal 1/3	7
–	Hind femur without distinct *pv* in distal 1/3; haltere dark brown	***F. nudifemorata***
7	Hind femur with 4 or 5 *pv* in distal half	**8**
–	Hind femur only with 2 or 3 *pv* in distal half; abdominal tergites 2–4 each with a median black stripe	***F. aethiops***

8 The median part of frons about as wide as anterior ocellus; frontal setae 6; each abdominal tergite with a triangular mark ..... ***F. ardua***

– The median part of frons about 2.5 times as wide as anterior ocellus; frontal setae 8 or 9; each abdominal tergite with a median black stripe..... ***F. stigi***

Catalogue of known Chinese species of the *F. postica*-group and description of one new taxon

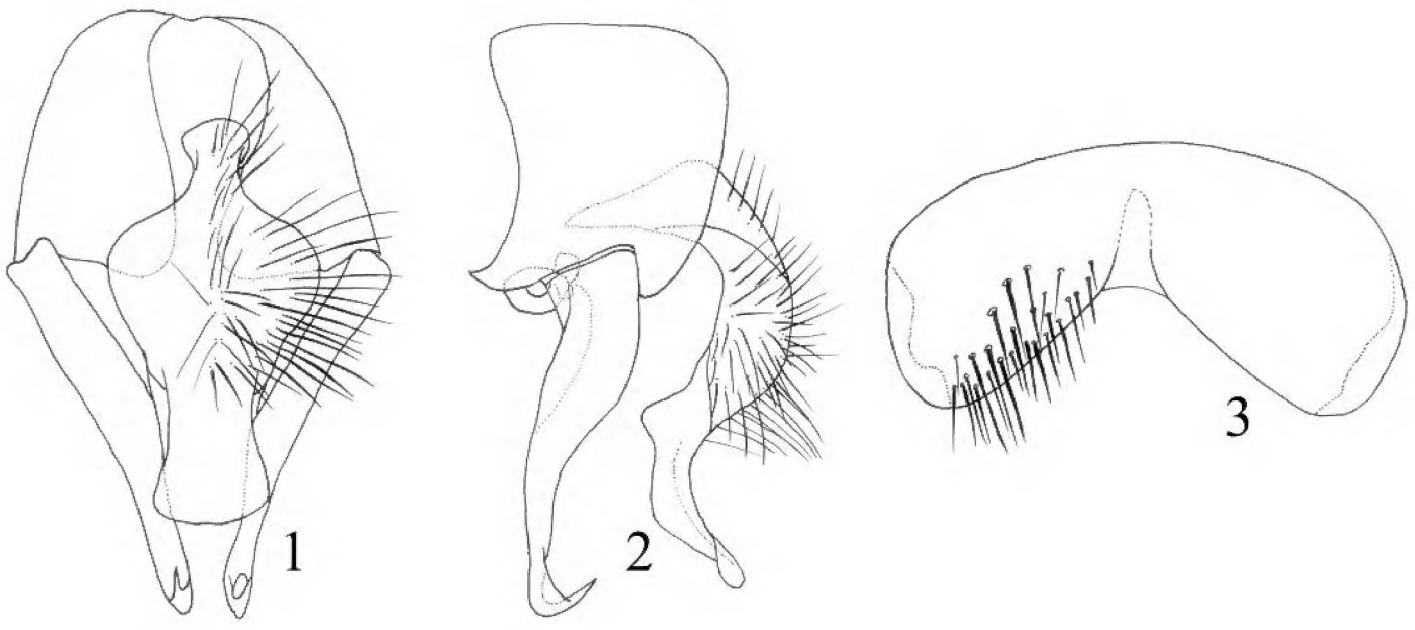
Fannia discoculea Xue in Xue & Wang, 1998

http://species-id.net/wiki/Fannia_discoculea

Figs 1–3

Fannia discoculea Xue in Xue and Wang 1998: 822–824; Wang and Xue 2002: 56; Su and Wang 2004: 111.

Description. MALE. Body length 3.5 mm. Eye bare; fronto-orbital plate and parafacial with greyish-white pruinosity; the median part of frons about 1.5 times as wide as anterior ocellus, fronto-orbital plate adjoined in upper half, frontal setae 5, situated in the lower 2/3 of frons, orbital setae absent; parafacial bare and narrow, about half as wide as postpedicel width at middle part; antenna black, postpedicel 1.5 times as long as wide, arista black, distinctly swollen in basal 1/4, haired, the longest hair about equal to aristal base; epistoma not projecting beyond vibrissal angle, vibrissal angle behind frontal angle in profile; gena and genal dilation with black hairs, upper margin of gena without upcurved setae; proboscis short, prementum slightly shining, with greyish-brown pruinosity, palpus black, slightly longer than prementum. Thorax ground-colour black, with thin greyish-brown pruinosity, scutum without stripes; presutural *acr* biserial, only prescutellar pairs slightly stout, *dc* 2+3, *ia* 0+2, *pra* 1, notopleuron without setulae; basisternum, proepisternum, anepimeron, meron and katepimeron bare; katepisternal setae 1:1, katepisternum without ventral spines; calypters yellowish, lower one slightly projecting beyond upper one. Wing brownish; costal spine inconspicuous; vein Sc curved bow-like; node of Rs bare on ventral and dorsal surfaces; crossveins without obvious cloud; haltere yellow. Legs entirely black; fore tibia without *ad* and median *p*; mid coxa without any hooked spines or spine-like setae on lower and outer margins, mid femur with 15 *av*, becoming gradually shorter towards apex, *pv* row distinct in basal 2/3, *p* row stout in distal part, mid tibia slightly swollen in distal part, with 1 *ad*, 1 *pd* and numerous hairs on ventral surface, the longest one about equal to mid tibia width, mid first tarsomere without basal tooth-like spines on ventral surface, only with a cluster of hairs; hind coxa with hairs on posterior surface, hind femur with 5 *av* and 2 *ad* in distal half, 2 long *pv* in distal 1/4, the longer one slightly longer than hind femoral width, hind tibia with 1 *av*, 1 *ad* and 1 *d*. Abdomen oval, depressed and flattened, ground-colour black, with thin greyish-brown pollinosity; syntergite 1+2 to tergite 4 each with a black triangular mark at middle; sternite 1 with hairs, sternite



Figures 1–3. *Fannia discoculea* Xue, 1998 (male) **1** terminalia, ventral view **2** terminalia, lateral view 3 sternite 5.

5 broad; cercal plate straight in apex, bare on ventral surface, median part distinctly broad; bacilloform process U-shaped in ventral view, ring-like in lateral view.

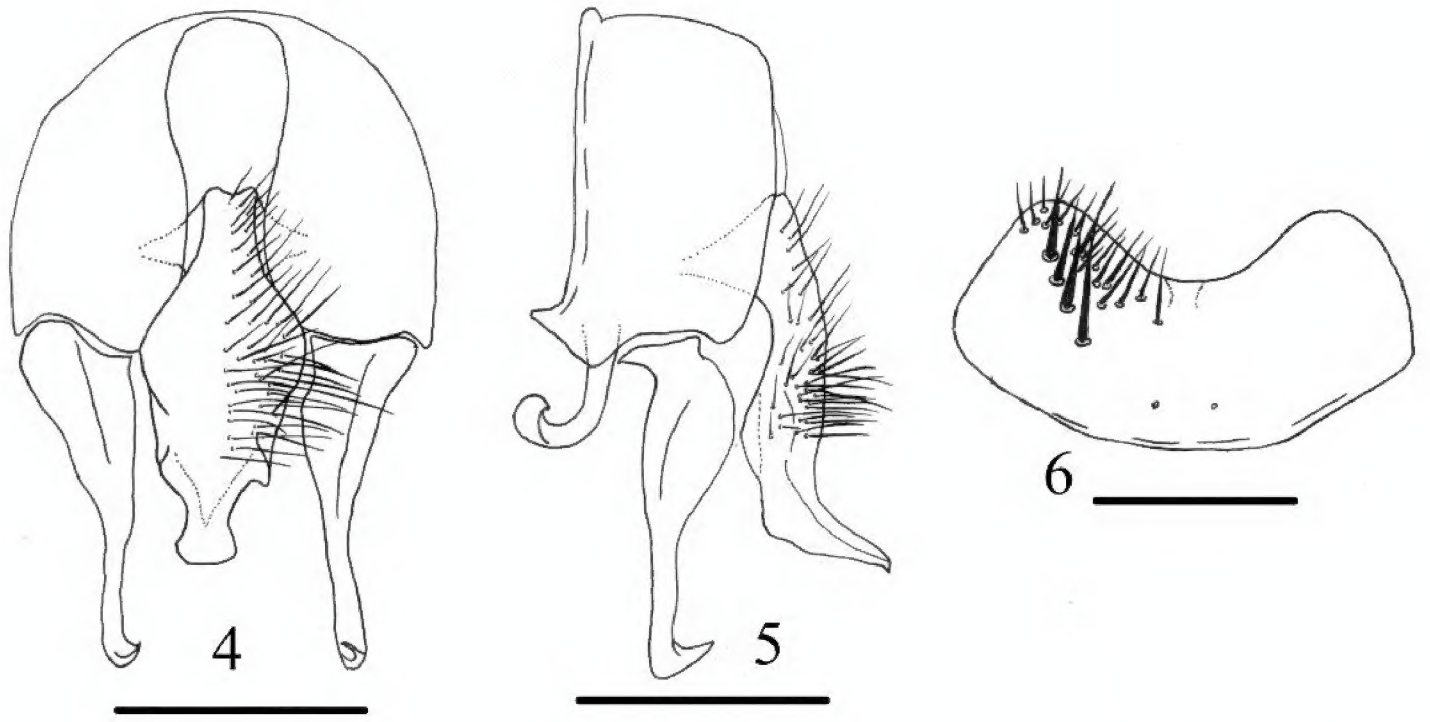
Material examined. Holotype ♂: China: Xinjiang: Jakesi, 43°49'12"N, 81°07'12"E, 6.VIII.1957, Coll. G. Wang.

Distribution. China (Xinjiang).

***Fannia postica* (Stein, 1895)**
http://species-id.net/wiki/Fannia_postica
Figs 4–6

Homalomyia postica Stein, 1895: 89.
Fannia postica (Stein): Hennig 1955: 72; Chillcott 1961: 103; Pont 1986: 53; Xue and Wang 1998: 819; Wang and Xue 2002: 57; Su and Wang 2004: 111; Wang et al. 2006: 555.

Description. MALE. Body length 4.0 mm. Eye bare, facets slightly enlarged on anterior margin in upper part; fronto-orbital plate, parafacial and gena with densely grey pruinosity; the median part of frons about 1.5 times as wide as anterior ocellus, as wide as 2/3 of postpedicel, frontal vitta black, linear at middle, frontal setae 6 or 7, situated in the lower 3/4 of frons, orbital setae absent; postocular setulae short, in one row, regularly placed; parafacial bare, about half as wide as postpedicel width at middle; antenna black, postpedicel 2.0 times as long as wide, arista black, distinctly swollen in basal part, ciliated, the longest hair about equal to aristal base; epistoma not projecting beyond vibrissal angle, vibrissal angle behind frontal angle in profile; gena and genal dilation with black hairs; genal height about 1/10 of eye height, upper margin of gena without upcurved se-



Figures 4–6. *Fannia postica* (Stein,1895) (male) **4** terminalia, ventral view **5** terminalia, lateral view 6 sternite 5, scale bar = 0.25mm.

tae; proboscis short, prementum with thin greyish-yellow pruinosity, its length 1.8–2.0 times as long as its width, palpus black, claviform, about as long as prementum. Thorax ground-colour black, with dark brown pruinosity, scutum without stripes; presutural *acr* biserial, only prescutellar pairs slightly stout, the distance between two *acr* rows slightly narrower than the distance between *acr* row and *dc* row, *dc* 2+3, *ia* 0+2, *pra* 2, the anterior one about 1/2 length of posterior notopleural seta, notopleuron without setulae; basisternum, proepisternum, anepimeron, meron and katepimeron bare; katepisternal setae 1:1, katepisternum without ventral spines; anterior spiracles yellowish, the posterior ones brownish-yellow; calypters yellow, lower one slightly projecting beyond upper one. Wing brownish; veins brown, tegula dark brown, basicosta brownish-yellow, costal spine inconspicuous; vein Sc curved bow-like; node of Rs bare on ventral and dorsal surfaces; veins R_{4+5} and M parallel to each other distally; crossveins without obvious cloud; haltere brownish-yellow. Legs entirely black; fore tibia without median *p*, fore first tarsomere with 2 or 3 longish basal setae on ventral surface; mid coxa without any hooked spines or spine-like setae on lower and outer margins, mid femur with sparse and long *av* row in basal half, becoming gradually shorter towards apex, comb-like in basal 1/3, *pv* row complete, becoming gradually shorter towards apex, *p* row complete, mid tibia swollen in distal half, with 1 *ad* and 1 *pd* in distal half, with numerous hairs on ventral surface, the longest ones about 3/4 of mid tibia width, mid first tarsomere without basal tooth-like spines on ventral surface; hind coxa bare on posterior surface, hind femur with short *av* row in basal half, becoming gradually longer towards apex, 4–6 long and stout *av* in distal half, *pv* row inconspicuous in basal half, 4 or 5 stout *pv* in distal half, hind tibia with 1 median *av*, 1 *ad* and 1 *d*. Abdomen oval, depressed and flattened, ground-colour black, with greyish-brown pollinosity; syntergite 1+2 to tergite 4 each with dark triangular mark at middle, tergite 5 only with narrow stripe at middle; sternite 1 bare.

Material examined. China: Heilongjiang: 2 ♂, Xilinji, 53°28'48"N, 122°22'12"E, 19.VI.1986, Coll. C.Y. Cui.

Distribution. China (Heilongjiang), Europe, North America.

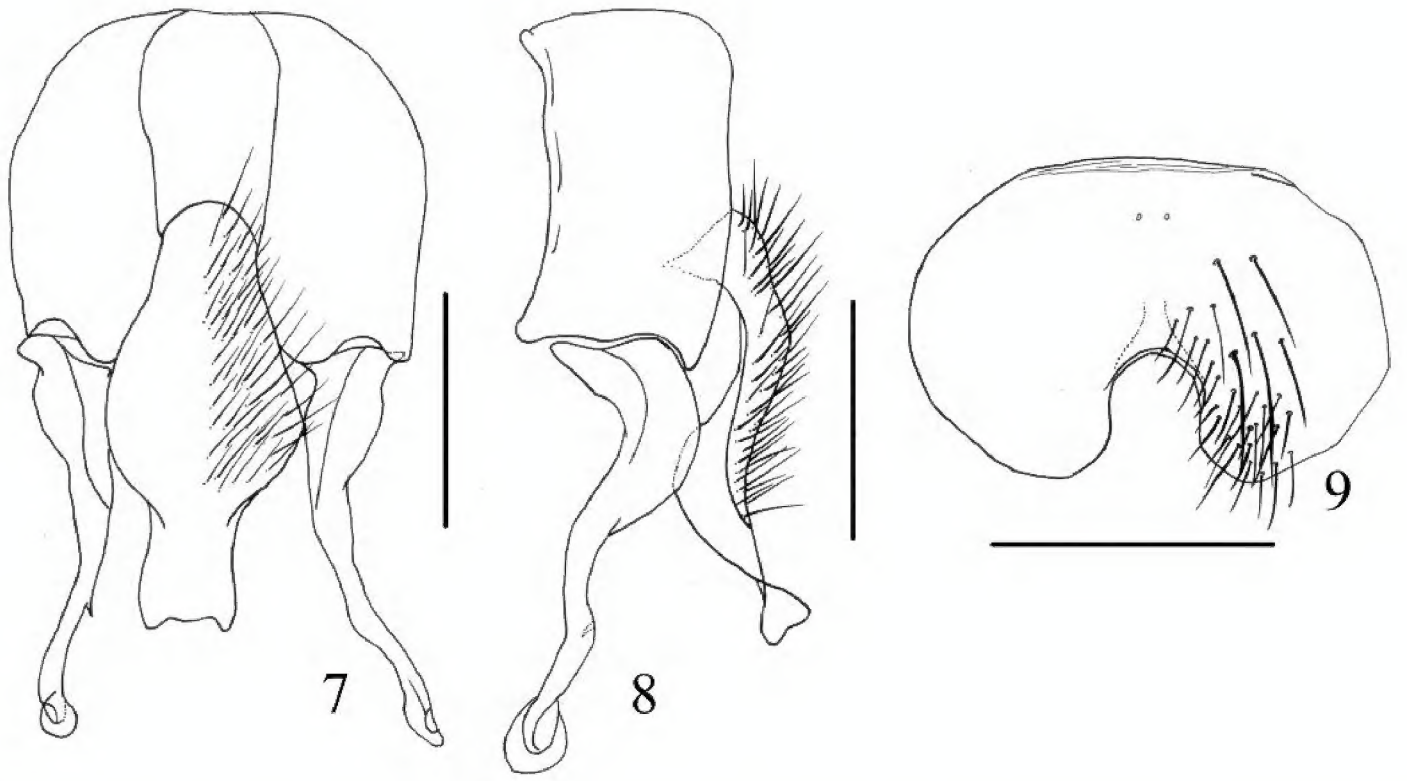
Fannia ringdahlana Collin, 1939

http://species-id.net/wiki/Fannia_ringdahlana

Figs 7–9

Fannia.ringdahlana Collin 1939:14; Nishida 1975: 378; Fan 1992: 216; Xue and Wang 1998: 815; Wang and Xue 2002: 57; Su and Wang 2004: 112; Wu and Wang 2002: 563; Wang et al. 2004: 34; Wang et al. 2006: 555.

Description. MALE. Body length 4.0–4.8 mm. Eye with short and brownish hairs, facets slightly enlarged on anterior margin in upper part; fronto-orbital plate with brownish-grey pruinosity in upper half, lower half of fronto-orbital plate and parafacial with densely silvery-grey pruinosity; the median part of frons about 1.5 times as wide as anterior ocellus, 2/3 as wide as postpedicel, frontal vitta black, linear at middle part, frontal setae 11 or 12, nearly reaching ocellar triangle, orbital setae absent; postocular setulae in one row, 4 or 5 ones long and fine in vertex, anteriorly curved, others short, regularly placed; parafacial bare, about1/2 as wide as postpedicel width at middle part; antenna black, postpedicel about 1.5 times as long as wide, arista black, distinctly swollen in basal 1/3, ciliated, the longest hairs slightly shorter than aristal base; epistoma not projecting beyond vibrissal angle, vibrissal angle behind frontal angle in profile; gena and genal dilation with black hairs; genal height about 1/10 of eye height, upper margin of gena without upcurved setae; proboscis short, prementum slightly shining, with thin greyish-yellow pruinosity, its length 1.5 times as long as its width, palpus black, claviform, slightly longer than prementum. Thorax ground-colour black, with dark brown pruinosity, scutum without stripes; presutural *acr* biserial, only prescutellar pairs slightly stout, the distance between two *acr* rows slightly narrower than the distance between *acr* row and *dc* row, *dc* 2+3, *ia* 0+2, *pra* 2, the anterior one about 3/5 of the length of posterior notopleural seta, notopleuron without setulae; basisternum, proepisternum, anepimeron, meron and katepimeron bare; katepisternal setae 1:1, katepisternum without ventral spines; spiracles dark brown; calypters dark brown, blackish-brown on the margin, lower one slightly projecting beyond upper one. Wing dark brown; veins dark brown, tegula black, basicosta dark brown, costal spine inconspicuous; vein Sc curved bow-like; node of Rs bare on ventral and dorsal surfaces; veins R_{4+5} and M conspicuously close to each other distally; crossveins without obvious cloud; haltere blackish-brown in base and apex, median part brown. Legs entirely black; fore tibia without *ad* and median *p*, fore first tarsomere with 2 or 3 longish basal setae on ventral surface; mid coxa without any hooked spines or spine-like setae on lower and outer margins, mid femur with sparse and long *av* row in basal half, becoming gradually shorter and denser towards apex, comb-like in basal 1/3, *pv* row complete, long and stout, slightly biserial at middle part, mid tibia distinctly swollen



Figures 7–9. *Fannia ringdahlana* Collin, 1939 (male) **7** terminalia, ventral view, scale bar = 0.25mm **8** terminalia, lateral view, scale bar = 0.25mm **9** sternite 5, scale bar = 0.40mm.

in distal half, with 1 *ad* and 1 *pd* in distal half, with numerous hairs on ventral surface, the longest one about 4/5 of mid tibia width, mid first tarsomere with basal tooth-like spines on ventral surface; hind coxa bare on posterior surface, hind femur with 2 *av* in subapical, 5 *ad* and 2 *d* in distal 1/3, *p* row seta-like in basal half, becoming gradually longer towards apex, 7 or 8 *pv* in distal 1/3, hind tibia with 1 *av*, 1 *ad*, 1 submedian *d* and 1 apical *d*, with numerous erect median setae on posterior surface. Abdomen long, depressed and flattened, ground-colour black, with densely brownish-grey pollinosity; syntergite 1+2 to tergite 4 each with a large triangular mark at middle, tergite 5 with a dark median stripe in basal half, the setae long and stout on the lateral margin of each tergite; sternite 1 with 1–3 fine and long setae on each lateral margin.

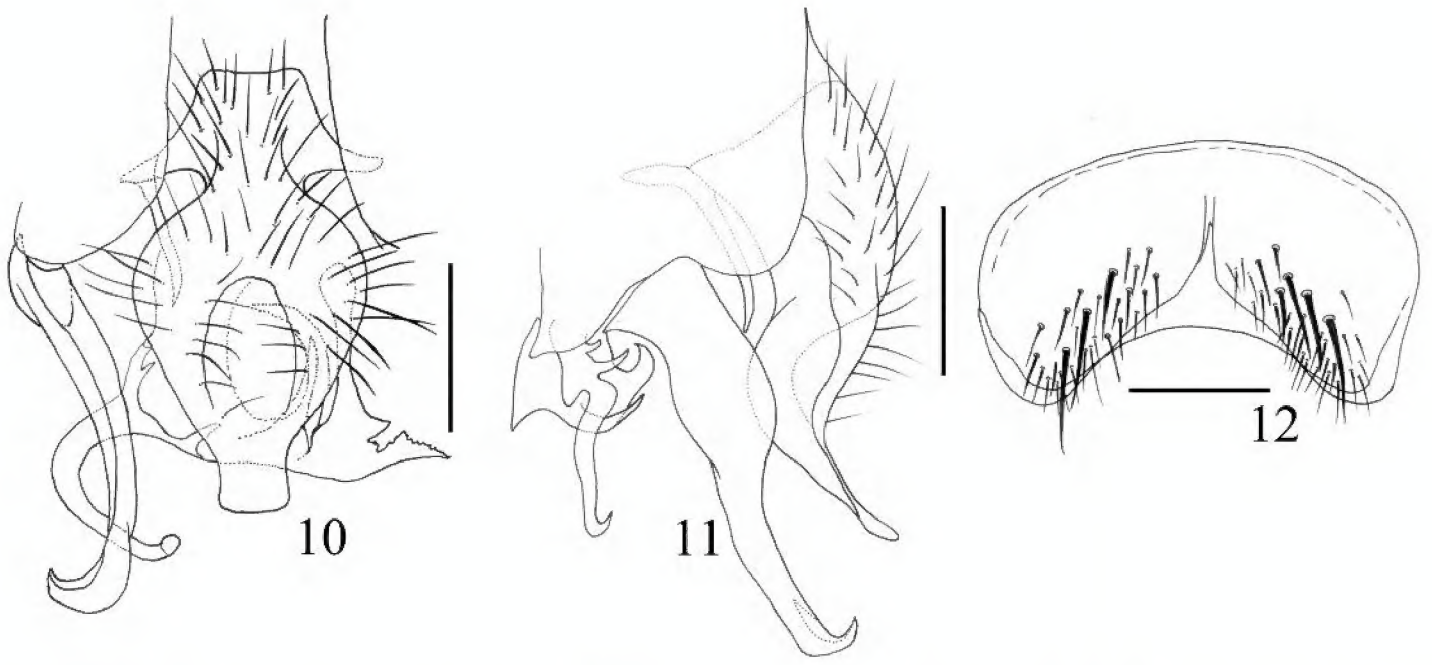
Material examined. China: Yunnan: 5 ♂, Xianggelila, Bitahai, 27°48'00"N, 99°54'00"E, 3700m, 2.VII.2006, Coll. M.F. Wang; 1 ♂, same locality and time, Coll. B.F. Wang; 5 ♂, same locality and time, Coll. L. Chang; 1 ♂, Deqin, Mt. Meili, 28°29'24"N, 98°55'48"E, 4000–4200m, 2.VII.2006, Coll. Y. Wang. Shanxi: 1 ♂, Ningwu, Mt. Luya, 38°43'48"N, 111°55'48"E, 12.VI.1987, Coll. M.F. Wang. Jilin: 2 ♂, Mt. Changbai, 42°19'48"N, 127°16'12"E, 18.VII.1988; 2 ♂, Mt. Changbai, Xiaotianchi, 42°34'48"N, 128°18'00"E, 25.VII.1982, Coll. L.Y. Gao. Sichuan: 1 ♂, Daocheng, Kasi, 29°2'24"N, 100°18'36"E, 2750–3000m, 12.VII.2006, Coll. C.T. Zhang; 9 ♂, Jiuzaigou, 33°15'36"N, 103°54'36"E, 2800m, 3.VI.2006, Coll. D. Wang; 3 ♂, same locality, 2.VI.2006, Coll. D. Jing; 2 ♂, same locality, 1.VI.2006, Coll. Y. Zhu.

Distribution. China (Shanxi, Jilin, Sichuan, Yunnan, Taiwan), Japan, Europe.

***Fannia aethiops* Malloch, 1913**
http://species-id.net/wiki/Fannia_aethiops
Figs 10–12

Fannia aethiops Malloch 1913: 628; Wang and Xue 1993: 458; Xue and Wang 1998: 818; Wang and Xue 2002: 55.

Description. MALE. Body length 4.5 mm. Eye bare, facets slightly enlarged on anterior margin in upper part; fronto-orbital plate with golden-brown pruinosity in upper half, lower half of fronto-orbital plate and parafacial with densely grey pruinosity; the median part of frons about 1.5 times as wide as anterior ocellus, 3/5 as wide as postpedicel, frontal vitta black, linear in narrowest part, frontal setae 9, nearly reaching ocellar triangle, orbital setae absent; postocular setulae in one row, short, regularly placed; parafacial bare, about as wide as 2/5 of postpedicel width at middle; antenna black, postpedicel broad, about 1.5 times as long as wide, arista black, distinctly swollen in basal part, ciliated, the longest hairs slightly shorter than aristal base; epistoma not projecting beyond vibrissal angle, vibrissal angle behind frontal angle in profile; gena with thin greyish-brown pruinosity, gena and genal dilation with black hairs; genal height about 1/11 of eye height, upper margin of gena without upcurved setae; prementum slightly shining, without distinct pruinosity, its length 1.5 times as long as its width, palpus black, slightly swollen and depressed in apex, about as long as prementum. Thorax ground-colour black, scutum and scutellum with densely brown pruinosity, pleura with thin greyish-brown pruinosity, scutum without distinct stripe; presutural *acr* biserial, only prescutellar pairs slightly stout, the distance between two *acr* rows slightly narrower than the distance between *acr* row and *dc* row, *dc* 2+3, *ia* 0+2, *pra* 2, the anterior one about 1/2 of the length of posterior notopleural seta, notopleuron without setuaae; basisternum, proepisternum, anepimeron, meron and katepimeron bare; katepisternal setae 1:1, katepisternum without ventral spines; spiracles brown; calypters brownish-yellow, lower one slightly projecting beyond upper one. Wing brownish; veins brown, tegula dark brown, basicosta brownish-yellow, costal spine conspicuous, about as long as 2/3 of crossvein r-m; vein Sc curved bow-like; node of Rs bare on ventral and dorsal surfaces; vein R_{4+5} straight, veins R_{4+5} and M conspicuously close to each other distally; crossveins without obvious cloud; haltere yellowish-brown. Legs black; fore tibia without median *p*, fore first tarsomere with few longish basal setae on ventral surface; mid coxa without any hooked spines or spine-like setae on lower and outer margins, mid femur with sparse and long *av* row in basal half, becoming gradually shorter and denser towards apex, bare in subapical part, 3 or 4 short setae in apical part, *pv* row complete, long and stout, slightly biserial on middle part, *p* row fine and long, mid tibia distinctly swollen in distal half, with 1 *ad* and 1 *pd* in distal half, with numerous hairs on ventral surface, the longest one about 3/4 of mid tibia width, mid first tarsomere with clustered basal hairs on ventral surface; hind coxa bare on posterior surface, hind femur with 1 stout *av* and 2 or 3 *pv* in subapical part, hind tibia with 1 median *av*, 1 *ad* and 1 *d*. Abdomen long, depressed and flattened,



Figures 10–12. *Fannia aethiops* Malloch, 1913 (male) **10** terminalia, ventral view **11** terminalia, lateral view **12** sternite 5, scale bar = 0.20mm.

ground-colour black, with densely greyish-brown pollinosity; syntergite 1+2 with broad black stripe on middle, tergites 3 and 4 with narrow black stripe on middle, tergite 5 without stripe; sternite 1 with 1or 2 long setae on each lateral margin.

Material examined. China: Shanxi: 1 ♂, Ningwu, Mt. Luya, 38°43'48"N, 111°55'48"E, 12.VI.1987, Coll. M.F. Wang. Jilin: 1 ♂, Mt. Changbai, 42°19'48"N, 127°16'12"E, 22.VI.1980, Coll. Z.Y. Ma.

Distribution. China (Shanxi, Jilin), North America, Europe.

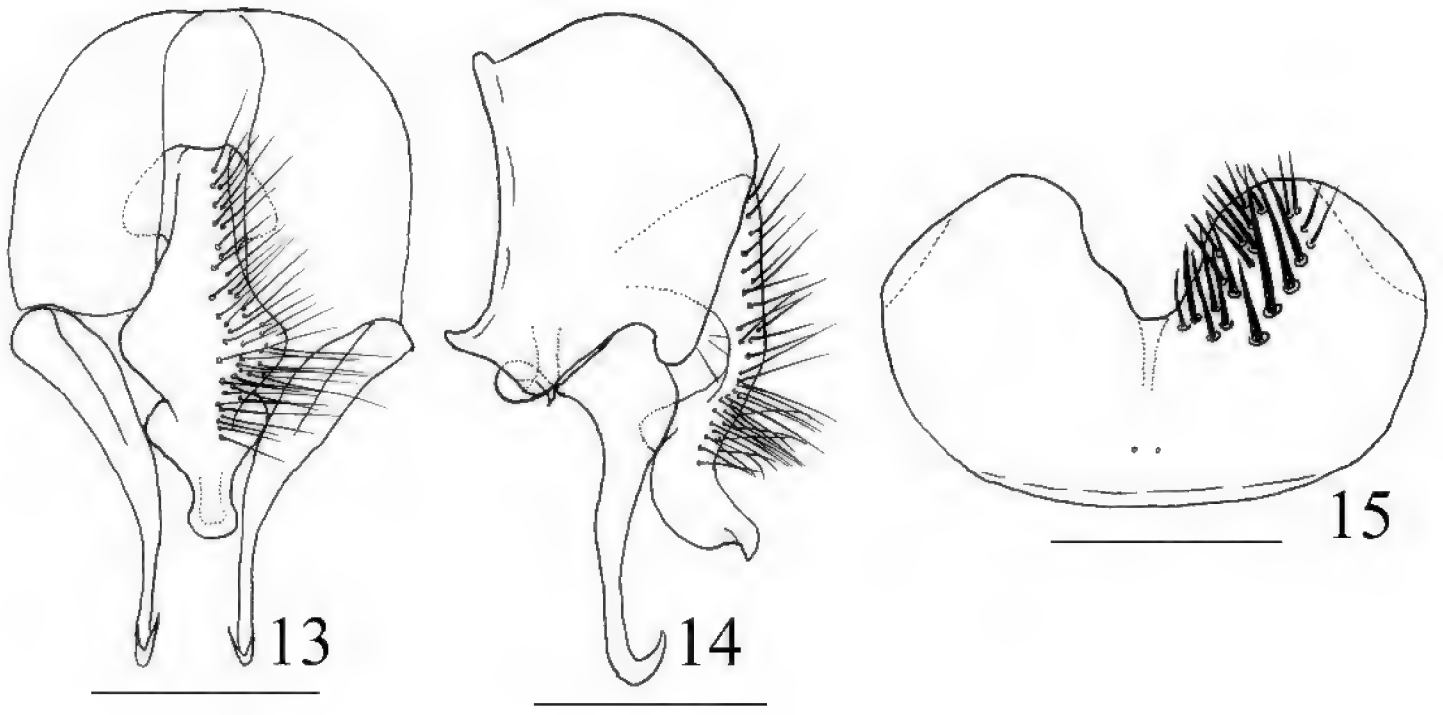
Fannia ardua Nishida, 1976

http://species-id.net/wiki/Fannia_ardua

Figs 13–15

Fannia ardua Nishida 1976: 135–137; Wang and Xue 2002: 55; Su and Wang 2004: 110; Wang et al. 2006: 555.

Description. MALE. Body length 4.0 mm. Eye bare, facets slightly enlarged on anterior margin in upper part; fronto-orbital plate with greyish-brown pruinosity in upper half, lower half of fronto-orbital plate and parafacial with silvery-grey pruinosity; the median part of frons about as wide as anterior ocellus, frontal vitta linear at middle, frontal setae 7 or 8, situated in the lower 2/3 of frons, orbital setae absent; postocular setulae in one row, regularly placed; parafacial bare, about 1/3 as wide as postpedicel width at middle; antenna black, postpedicel about 1.2 times as long as wide, arista black, distinctly swollen in basal 1/5, ciliated, the longest hairs about as long as aristal base; epistoma not projecting beyond vibrissal angle, vibrissal angle behind frontal angle in profile; gena and genal dilation with black hairs; genal height about 1/10 of eye height, upper margin of gena without upcurved setae; prementum shining, with thin



Figures 13–15. *Fannia ardua* Nishida, 1976 (male) **13** terminalia, ventral view **14** terminalia, lateral view **15** sternite 5, scale bar = 0.25mm.

grey pruinosity, its length 2.0 times as long as its width, palpus black, claviform, slightly longer than prementum. Thorax ground-colour black, with thin greyish-brown pruinosity, scutum without distinct stripe; presutural *acr* biserial, only prescutellar pairs slightly stout, the distance between two *acr* rows slightly narrower than the distance between *acr* row and *dc* row, *dc* 2+3, *ia* 0+2, *pra* 2, the anterior one about 1/2 as long as posterior notopleural seta, notopleuron without setulae; basisternum, proepisternum, anepimeron, meron and katepimeron bare; katepisternal setae 1:1, katepisternum without ventral spines; spiracles brown; calypters brown, lower one slightly projecting beyond upper one. Wing brownish; veins brown, tegula black, basicosta brown, costal spine inconspicuous; vein Sc curved bow-like; node of Rs bare on ventral and dorsal surfaces; vein R_{4+5} straight, veins R_{4+5} and M conspicuously close to each other distally; crossveins without obvious cloud; haltere yellowish-brown. Legs entirely black; fore tibia without *ad* and median *p*; mid coxa without any hooked spines or spine-like setae on lower and outer margins, mid femur narrowed and bare in subapical part, with 6 or 7 sparse and long *av* in basal 2/5, becoming gradually shorter and denser towards apex, *pv* row complete, biserial at middle, *p* row stout, mid tibia distinctly swollen in distal part, with 1 *ad* and 1 *pd* in distal half, with numerous hairs on ventral surface, the longest ones shorter than mid tibia width, mid first tarsomere with 1 tooth-like basal process on ventral surface; hind coxa bare on posterior surface, hind femur with 1 subapical *av*, 1 apical *d*, 1 apical *pd*, 3 *ad* in distal 1/3 and 5 *pv* in distal half, hind tibia with 1 *av*, 1 *ad*, 1 median *d* and 1 apical *d*. Abdomen long, depressed and flattened, ground-colour black, with densely greyish-brown pollinosity; syntergite 1+2 to tergite 4 each with dark triangular mark at middle, tergite 5 only with a dark stripe at middle; sternite 1 with 4 or 5 long setae on each lateral margin.

Material examined. China: Jilin: 1 ♂, Mt. Changbai, 42°19'48"N, 127°16'12"E, 10.VII.1998.

Distribution. China (Jilin), Japan.

Fannia coculea Nishida, 1975

http://species-id.net/wiki/Fannia_coculea

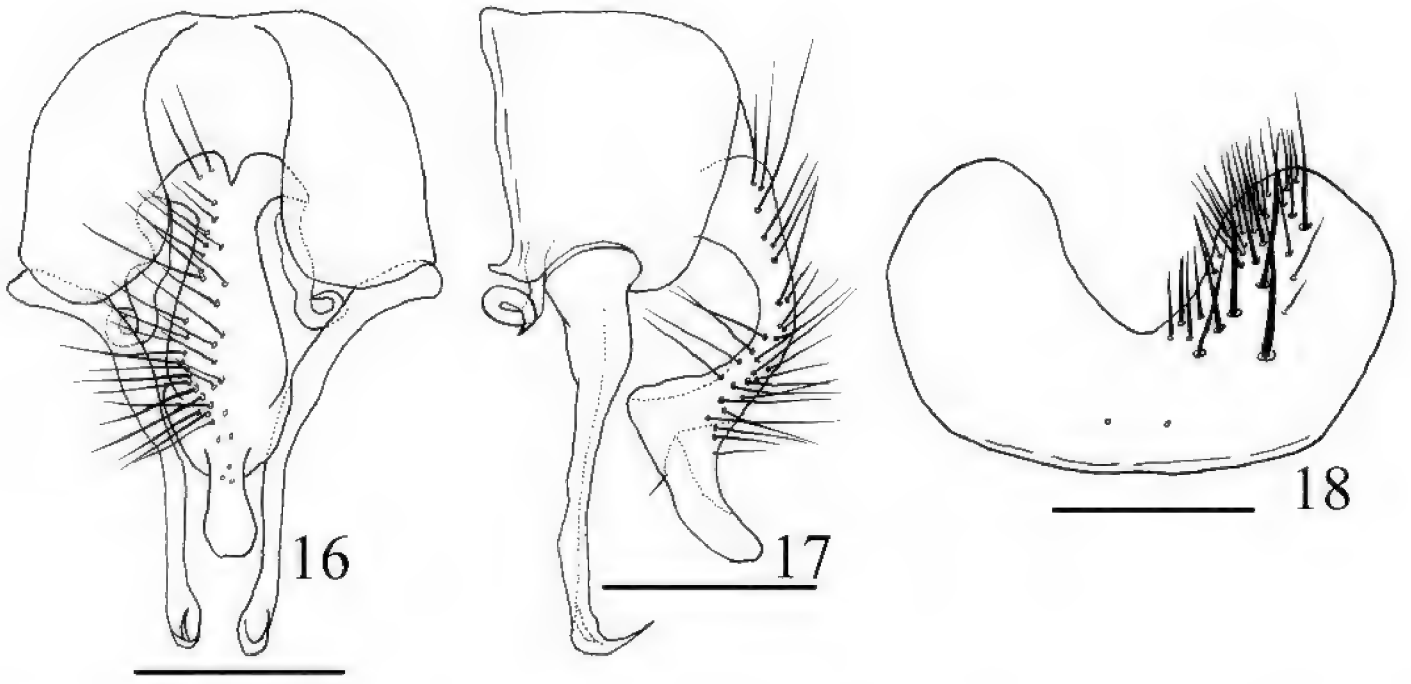
Fannia coculea Nishida, 1975: 368–370; Xue and Wang, 1998: 815; Wang and Xue, 2002: 56; Su and Wang, 2004: 110.

Distribution. China (Taiwan).

Fannia nudifemorata Wang and Zhang, sp. n.

urn:lsid:zoobank.org:act:49E9C8CB-DF77-4B77-AC17-4B3589494995
http://species-id.net/wiki/Fannia_nudifemorata
Figs 16–18

Description. MALE. Body length 4.5–5.0 mm. Eye bare, facets slightly enlarged on anterior margin in upper part; fronto-orbital plate, parafacial and gena with silvery-grey pruinosity; the median part of frons about 2.0 times as wide as anterior ocellus, about 4/5 of postpedicel, slightly narrower than the distance between two posterior ocelli, frontal vitta black, about as wide as fronto-orbital plate, frontal setae 11–13, situated in the lower 4/5 of frons, the gaps filled with numerous fine setae, orbital setae absent; postocular setulae long and curved anteriorly; parafacial bare, about 2/5 as wide as postpedicel width at middle; antenna black, postpedicel about 1.5 times as long as wide, arista black, distinctly swollen in basal part, ciliated, the longest hairs shorter than aristal base; epistoma not projecting beyond vibrissal angle, vibrissal angle behind frontal angle in profile; gena and genal dilation with black hairs; genal height about 1/9 of eye height, upper margin of gena with 1 or 2 upcurved setae; prementum shining, with thin greyish-yellow pruinosity, its length 2.0 times as long as its width, palpus black, claviform, slightly longer than prementum. Thorax ground-colour black, with brownish-grey pruinosity, scutum without distinct stripe; presutural *acr* biserial, only prescutellar pairs slightly stout, the distance between two *acr* rows about 1/2 of the distance between *acr* row and *dc* row, *dc* 2+3, *ia* 0+2, *pra* 2, the anterior one about 1/2 of the length of posterior notopleural seta, notopleuron without setulae; basisternum, proepisternum, anepimeron, meron and katepimeron bare; katepisternal setae 1:1, katepisternum without ventral spines; spiracles brown; calypters brown, lower one not projecting beyond upper one. Wing brownish; tegula black, basicosta brown, costal spine inconspicuous; vein Sc curved bow-like; node of Rs bare on ventral and dorsal surfaces; vein R_{4+5} straight, veins R_{4+5} and M conspicuously close to each other distally; crossveins without obvious cloud; haltere dark brown at apex. Legs entirely black; fore



Figures 16–18. *Fannia nudifemorata* Wang and Zhang, sp. n. (male) **16** terminalia, ventral view **17** terminalia, lateral view **18** sternite 5, scale bar = 0.25mm.

tibia without median *p*, fore first tarsomere with several longish setae on ventral surface; mid coxa without any hooked spines or spine-like setae on lower and outer margins, mid femur with a long and sparse *av* row in basal half, becoming gradually shorter and denser towards apex, *pv* row long and stout, biserial at middle, *p* row complete and long, mid tibia distinctly swollen in distal half, with 1 *ad* and 1 *pd*, with numerous hairs on ventral surface, the longest one slightly shorter than mid tibia width, mid first tarsomere with basal cluster of hairs on ventral surface; hind coxa bare on posterior surface, hind femur with 1 long subapical *av*, 4 or 5 long *ad* in distal 1/3, and 2 or 3 *p* rows in basal 2/3, *pv* row in distal 2/3, hair-like, hind tibia with 1 median *av*, 1 *ad*, 1 *d* and several erect short setae on posterior surface. Abdomen long, depressed and flattened, ground-colour black, with densely bluish-grey pollinosity; syntergite 1+2 to tergite 4 each with a dark triangular mark at middle, tergite 5 only with a dark stripe at middle, each tergite with long setae on lateral part; sternite 1 with 10–12 setae.

Female: Unknown.

Material examined. Holotype, ♂: China: Yunnan: Yulongxueshan, 27°5'24N, 100°15'00"E, 3200m, 24.V.2007, Coll. W.X. Dong. Paratype, 1 ♂, same locality and time, Coll. S.C. Bai.

Remarks. This new species belongs to the *F. spathiophora*-subgroup of *F. postica*-group. It can easily be separated from its allies by hind femur without stout *pv* and bare from *p* to *pv* surface in distal 1/3. It resembles *F. ardua* but differs from the latter in having the median part of frons about 2.0 times as wide as anterior ocellus, frontal setae 11–13, lower calypter not projecting beyond upper one, haltere dark brown at apex. The new species is also similar to *F. umbrosa* (Stein, 1895), but differs from it in having hind femur without distinct *pv* row in distal 1/3.

Distribution. China (Yunnan).

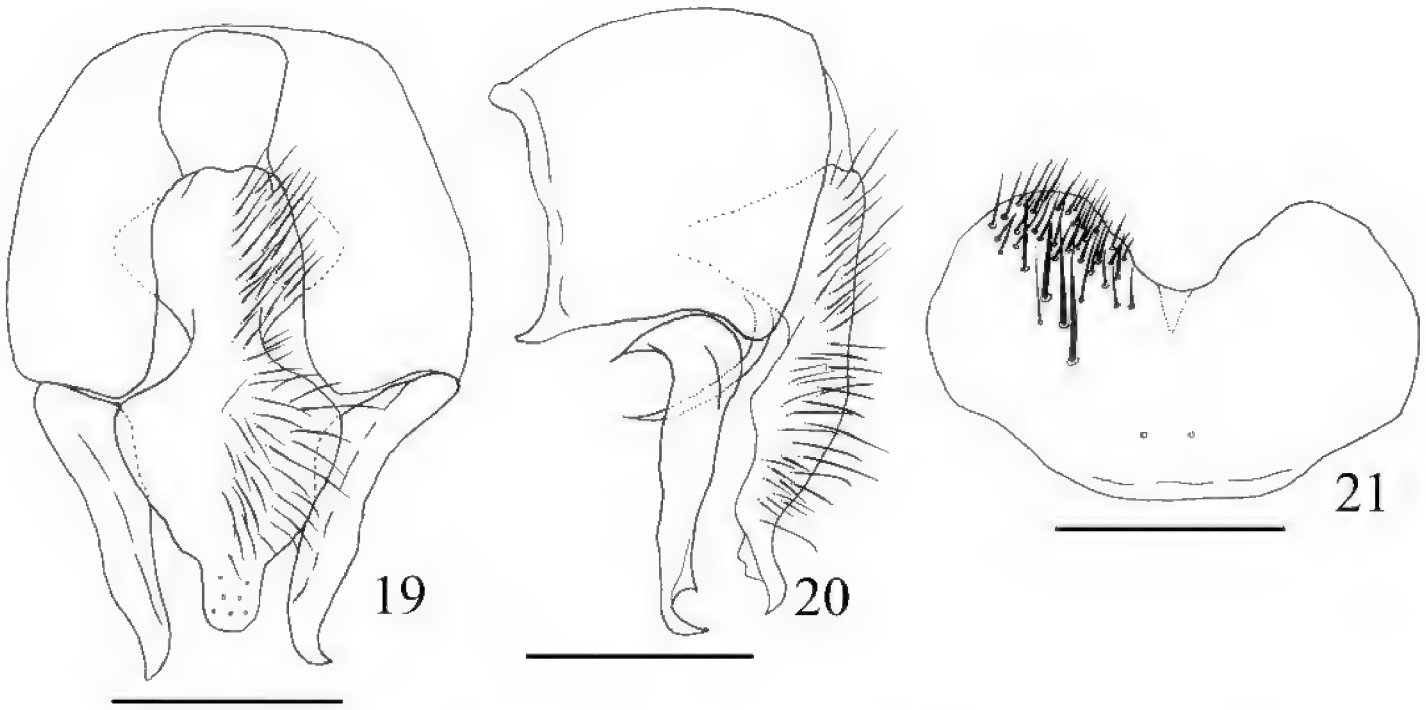
Fannia spathiophora Malloch, 1918

http://species-id.net/wiki/Fannia_spathiophora

Figs 19–21

Fannia spathiophora Malloch 1918: 294; Pont 1986: 56; Fan 1992: 217; Xue and Wang 1998: 815; Wang and Xue 2002: 57; Wu and Wang 2002: 563; Su and Wang 2004: 112; Wang et al. 2004: 34;Wang et al. 2006: 556.

Description. MALE. Body length 4.5–5.0 mm. Eye bare, facets slightly enlarged on anterior margin in upper part; fronto-orbital plate with brownish-grey pruinosity in upper half, lower half of fronto-orbital plate and parafacial with silvery-grey pruinosity; the median part of frons about 1.5 times as wide as anterior ocellus, about 2/3 of pedicel, frontal vitta linear in upper half, frontal setae 7 or 8, situated in the lower 3/4 of frons, orbital setae absent; postocular setulae short, regularly placed; parafacial bare, about 1/3 as wide as postpedicel width at middle; antenna black, postpedicel about 2.0 times as long as wide, arista black, distinctly swollen in basal 1/4, ciliated, the longest hairs slightly shorter than aristal base; epistoma not projecting beyond vibrissal angle, vibrissal angle behind frontal angle in profile; gena and genal dilation with black hairs; genal height about 1/11 of eye height, upper margin of gena without upcurved setae; prementum shining, with thin grey pruinosity, its length 1.5–2.0 times as long as its width, palpus black, claviform, slightly longer than prementum. Thorax ground-colour black, with dense brown pruinosity, scutum without distinct stripe; presutural *acr* biserial, only prescutellar pairs slightly stout, the distance between two *acr* rows slightly narrower than the distance between *acr* row and *dc* row, *dc* 2+3, *ia* 0+2, *pra* 2, the anterior one about 1/2 of the length of posterior notopleural seta, notopleuron without setulae; basisternum, proepisternum, anepimeron, meron and katepimeron bare; katepisternal setae 1:1, katepisternum without ventral spines; spiracles brown; calypters dark brown, lower one projecting beyond upper one. Wing brownish; veins brown, tegula black, basicosta brown, costal spine inconspicuous; vein Sc curved bow-like; node of Rs bare on ventral and dorsal surfaces; vein R_{4+5} straight, veins R_{4+5} and M conspicuously close to each other distally; crossveins without obvious cloud; haltere dark brown. Legs black, except knees yellow; fore tibia with 7–9 *pv*; mid femur with long and sparse *av* row in basal half, becoming gradually shorter and denser towards apex, bare in subapical part, 4 or 5 short setae in apical part, *pv* row biserial at middle, *p* row complete, mid tibia distinctly swollen towards apex, with 1 *ad* and 1 *pd* in distal half, 2 long and curved apical hairs on ventral surface, with numerous hairs on ventral surface, the longest ones slightly shorter than mid tibia width, mid first tarsomere with tooth-like basal process on ventral surface; hind coxa bare on posterior surface, hind femur with 1 subapical *av*, *pv* row hair-like in basal half, becoming gradually longer towards apex, 6 or 7 stout and long *pv* in basal 1/3, hind tibia with 1 *av*, 1 *ad* and 1 median *d*. Abdomen long, depressed and flattened, ground-colour black, with dense brownish-grey pollinosity; syntergite 1+2 to tergite 4 each with a dark triangular mark at middle, tergite 5 only with a dark stripe at middle; sternite 1 with 1–3 long setae on each lateral margin.



Figures 19–21. *Fannia spathiophora* Malloch, 1918 (male) **19** terminalia, ventral view **20** terminalia, lateral view **21** sternite 5, scale bar = 0.25mm.

Material examined. China: Shanxi: 1 ♂, Hunyuan, 39°42'00"N, 113°40'48"E, 12.VII.1985, Coll. M.F. Wang. Liaoning: 2 ♂, Xinbin, Gangshan, 41°43'12"N, 125°01'12"E, -.VI.1981, Coll. Z.Y. Ma; 1 ♂, same locality, 08.IX. 1990; 2 ♂, Benxi, Yanghugou, 41°18'00"N, 123°43'48"E, 01.VII.1993, Coll. Y.S. Cui; 1 ♂, same locality, 01.VII.1993, Coll. C.T. Zhang; 1 ♂, Huanren, 41°16'12"N, 125°21'00"E, 09.VI.1994, Coll. D. Wei; 3 ♂, Qianshan, 41°01'48"N, 123°07'48"E, 25.VI.2007, Coll. M.F. Wang. Jilin: 1 ♂, Baihe, 42°34'48"N, 128°02'24"E, 20.VI.1980, Coll. Z.Y. Ma; 1 ♂, Mt. Changbai, 42°19'48"N, 127°16'12"E, 19.VII.1986; 1 ♂, Mt. Changbai, 42°19'48"N, 127°16'12"E, 15.VII.1990. Heilongjiang: 1 ♂, Guyuan, 50°34'48"N, 123°42'00"E, 26.VI.1980, Coll. C.Y. Cui; 1 ♂, Wuying, 48°06'36"N, 129°14'24"E, 16.VII.1977, Coll. C.Y. Cui; 1 ♂, Bizhou, 51°56'24"N, 124°36'00"E, 13.VII.1980.

Distribution. China (Shanxi, Liaoning, Heilongjiang, Jilin), Japan, Europe, North America.

Fannia stigi Rognes, 1982

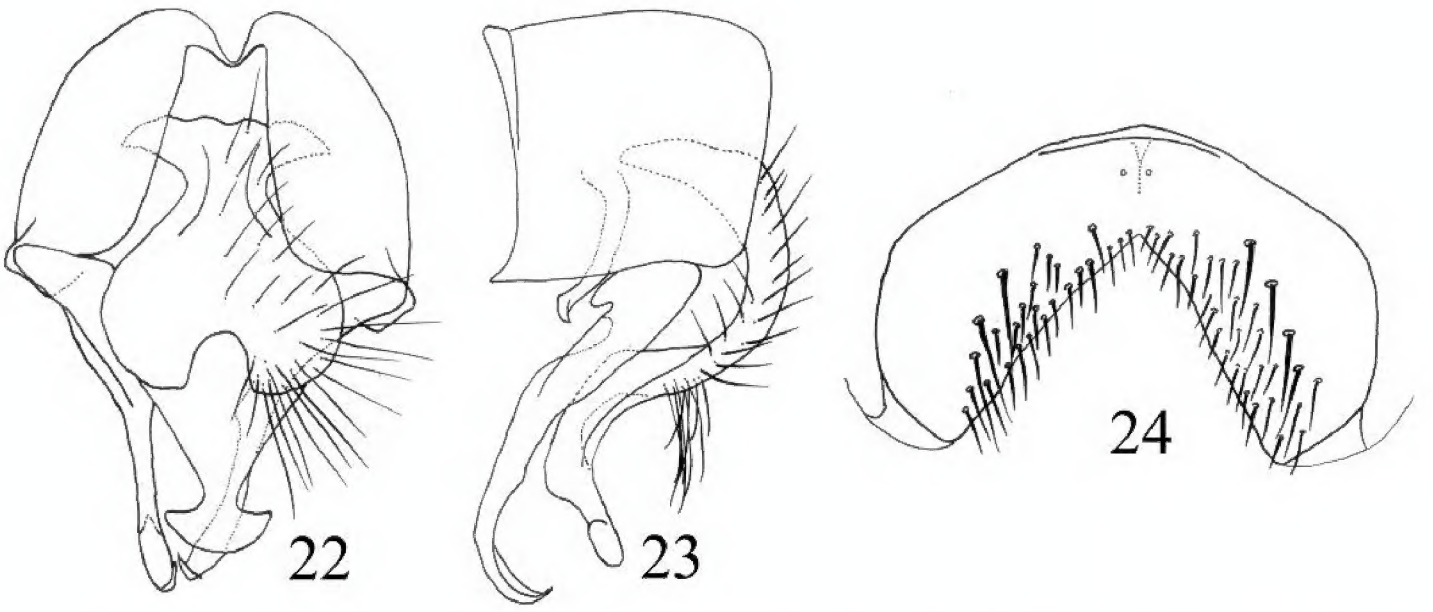
http://species-id.net/wiki/Fannia_stigi

Figs 22–24

Fannia stigi Rognes, 1982: 325–329.

Fannia tigripeda Xue, Wang and Li 2001: 225–226; Wang and Xue 2002: 57; Su and Wang 2004: 112. syn. nov.

Description. MALE. Body length 4.5–5.0 mm. Eye bare, facets slightly enlarged on anterior margin in upper part; fronto-orbital plate with dark cupreous pruinosity; the



Figures 22–24. *Fannia stigi* Rognes, 1982 (Holotype of *Fannia tigripeda* Xue, Wang & Li, 2001) (male) **22** terminalia, ventral view **23** terminalia, lateral view **24** sternite 5.

median part of frons about 2.5 as wide as anterior ocellus, slightly narrower than postpedicel, frontal vitta black, linear at middle, frontal setae 8 or 9, nearly reaching ocellar triangle; parafacial with silvery-grey pruinosity, slightly narrower than 1/3 of postpedicel width at middle; antenna black, postpedicel about 2.5 times as long as wide, arista distinctly swollen at base, the longest hairs slightly shorter than aristal base; gena and genal dilation with black hairs; genal height about 1/10 of eye height; proboscis short, labella large, the length of prementum 2.5 times as long as its width, palpus black, slightly longer than prementum. Thorax ground-colour black, with thin grey pruinosity, slightly shining, scutum without distinct stripe; presutural *acr* biserial, only prescutellar pairs slightly stout, the distance between two *acr* rows slightly narrower than the distance between *acr* row and *dc* row, *dc* 2+3, *ia* 0+2, *pra* 2, the anterior one about 1/2 the length of posterior notopleural seta, notopleuron without setulae; basisternum, proepisternum, anepimeron, meron and katepimeron bare; katepisternal setae 1:1; spiracles brownish; calypters brownish, lower one not projecting beyond upper one. Wing brownish; tegula black, basicosta brown, costal spine inconspicuous; vein Sc curved bow-like; node of Rs bare on ventral and dorsal surfaces; vein R_{4+5} straight, veins R_{4+5} and M parallel to each other distally; crossveins without obvious cloud; haltere dark brown. Legs entirely black; fore tibia without median *p*; mid femur concave at apex on ventral surface, with comb-like *av* row, becoming shorter towards apex, *pv* row distinct in basal 2/3, 1 short and erect *pv* row in subapical part, with 1 complete *p* row, among which subapical 2 stout, mid tibia distinctly swollen in distal half, with 1 *ad* and 1 *pd* in submedian part, with numerous hairs on ventral surface, the longest ones slightly longer than mid tibia width, mid first tarsomere with tooth-like basal process on ventral surface; hind coxa bare on posterior surface, hind femur with 1 short subapical *av*, 4 or 5 long *pv* in distal 1/3, hind tibia with 1 *av*, 1 *ad* and 1 *d* in submedian part. Abdomen long, depressed and flattened, ground-colour black, with brownish-grey pollinosity; syntergite 1+2 to tergite 5 each with a black stripe on middle; sternite 1 with short setae on each lateral margin.

Remarks. Rognes (1982) described *F. stigi* as new to science from Norway and Sweden, and also provided detailed description and high-quality illustrations. When re-examined the holotype of *F. tigripeda*, we found its morphological characters, especially the male terminalia, is similar with *F. stigi*. Whereas, we have not studied the types of *F. stigi*, but it is clear from Rognes's notes and figures on *stigi* that our *tigripeda* is actually his *stigi*. An anonymous reviewer also pointed out the possible synonymy of *F. stigi* and *F. tigripeda*. We confident that *F. tigripeda* is a new junior synonym for *F. stigi*.

Material examined. 1 ♂: China: Jilin, Mt. Changbai, 42°19'48"N, 127°16'12"E, 1700m, 28.VI.1997, Coll. W.Q. Xue (holotype of *F. tigripeda*). Shanxi: 1 ♂, Ningwu, 38°43'48"N, 111°55'48"E, 07.VI.1982, Coll. M.F. Wang.

Distribution. China (Shanxi, Jilin), Norway, Sweden.

Discussion

Chillcott (1961) revised the Nearctic species of the genus and assigned the 148 Holarctic species to 11 species groups and 15 subgroups, including the *Fannia postica*-group. He recognized that the relationship between the *F. postica*-group, *F. hirticeps*-group and *F. lugubrina*-group was very close (Chillcott 1961). Since Chillcott (1961), Domínguez and Roig-Juñent (2008) proposed a phylogenetic hypothesis of the family Fanniidae, using 151 characters from adult external morphology and female and male terminalia for 78 fanniid species. The analysis, including the *F. postica*-subgroup and *F. spathiophora*-subgroup, also recovered the paraphyletic of the *F. postica*-group, which nested within the *F. carbonaria*-group, *F. hirticeps*-group and *F. lugubrina*-group (Domínguez and Roig-Juñent, 2008). A phylogenetic revision of the genus *Fannia*, from molecular data and more characters of immature stages or adult morphology, at the species-group level is required to establish a more reasonable species-group classification.

After a systematic study of these species and related species, we found that the *F. postica*-group can be distinguished from other *Fannia* in having the median part of the male cercal plate distinctly swollen in ventral view, the median part curving anteriorly and the apex curving posteriorly in lateral view. In the course of this study, we also found that a number of characters, including the number of distal *av* on hind femur and the shape of male cercal plate (Chillcott 1961: 101), which have previously been described as being diagnostic characters for the *F. postica*-subgroup and *F. spathiophora*-subgroup, are variable and unreliable.

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References

Chillcott JG (1961) A revision of the Nearctic species of Fanniinae (Diptera: Muscidae). Canadian Entomologist Supplement 14 (1960): 1–295.

Collin JE (1939) On various new or little known British Diptera, including several species bred from the nests of birds and mammals (Part.). Entomologist's Monthly Magazine 75: 134–144.

Domínguez MC, Roig-Juñent SA (2008) A phylogeny of the family Fanniidae Schnabl (Insecta: Diptera : Calyptratae) based on adult morphological characters, with special reference to the Austral species of the genus *Fannia*. Invertebrate Systematics 22: 563–587. doi:10.1071/IS08003

Fan ZD (1992) Key to the common flies of China, second edition. Science Press, Beijing, 992 pp.

Gregor F, Rozkošný R (2005) A new species of *Fannia* (Diprera: Fanniidae) from central Europe. Biologia Bratislava 60(5): 519–522.

Hennig W (1955) Muscidae. In: Lindner E (Ed) Die Fliegen der Palaearktischen Region, 63b (part). Schweizerbart, Stuttgart, 1–99.

McAlpine JF (1981) Morphology and terminology–adults. In: McAlpine JF, Peterson BV, Shewell GE, Teskey HJ, Vockeroth JR, Wood DM (Eds) Manual of Nearctic Diptera, Vol. 1. Research Branch, Agriculture Canada Monograph, 27, Ottawa, 9–63.

Malloch JR (1913) Notes on some American Diptera of the genus *Fannia*, with descriptions of new species. Proceedings of the United States National Museum 44: 621–631.

Malloch JR (1918) Diptera from the Southwestern United States, Paper IV, Anthomyiidae. Transactions of the American Entomological Society 44: 263–319.

Nishida K (1975) Six new and one newly recorded species of the genus *Fannia* (Diptera: Muscidae) from Taiwan, with a key to species. Kontyû 43(3): 364–380.

Nishida K (1976) Studies on the species of Fanniinae (Diptera: Muscidae) from Japan. IV. Five new and two newly recorded species of genus *Fannia* from Japan. Japanese Journal of Sanitary Zoology 27(2): 133–143.

Pont AC (1986) Family Fanniidae. In: Soós Á, Papp L (Eds) Catalogue of Palaearctic Diptera. Volume 11. Scathophagidae–Hypodermatidae. Akadémiai Kiadó, Budapest, 41–57.

Rognes K (1982) *Fannia stigi* n. sp. from Scandinavia (Diprera: Fanniidae). Entomologica Scandinavica 13: 325–330.

Rozkošný R, Gregor F, Pont AC (1997) The European Fanniidae (Diptera). Acta Scientiarum naturalium Academiae scientiarum Bohemicae-Brno 31: 1–80.

Stein P (1895) Die Anthomyidengruppe *Homalomyia* nebst ihren Gattungen und Arten. Berliner entomologische Zeitschrift 40: 89.

Stuckenberg BR (1999) Antennal evolution in the Brachycera (Diptera), with a reassessment of terminology relating to the flagellum. Studia dipterologica 6: 33–48.

Su LX, Wang MF (2004) Studies on classification of the genus *Fannia* in China (Diptera: Fanniidae). Chinese Journal of Vector Biology and Control 15(2): 110–112.

Wang BF, Wang MF, Xue WQ (2006), Studies on fauna of Fanniidae in Dongbei region of China. Chinese Journal of Pest Control 22(8): 554–557.

Wang MF, Wu YX (1996) Taxonomic study of Fannidae in Shanxi (Diptera). Shanxi Journal of Preventive Medicine 5(2): 65–67.

Wang MF, Xue WQ (1993) Three newly recorded species of Fanniinae from China. Acta Zootaxonomica Sinica 18(4): 458.

Wang MF, Xue WQ (2002) Taxonomic study on Fanniidae of China (Diptera: Cyclorrhapha). In: Li DM, Kang L, Wu JW (Eds) Innovation and Development in Entomology. Science and Technology Press of China, Beijing, 54–59.

Wang MF, Xue WQ, Cao XF (2004) Studies on the Family Fanniidae from the Subregion Loess Plateau of China (Diptera:Fanniidae). Chinese Journal of Vector Biology and Control 15(1): 33–35.

Wu YX, Wang MF (2002) Studies on the family Fanniidae from Shanxi (Diptera: Cyclorrhapha). In: Li DM, Kang L, Wu JW (Eds) Innovation and Development in Entomology. Science and Technology Press of China, Beijing, 562–564.

Xue WQ, Wang MF (1998) Fanniidae. In: Xue WQ, Chao CM (Eds) Flies of China. Volume1. Liaoning Science and Technology Press, Shenyang, 809–835.

Xue WQ, Wang MF, Li FH (2001) The descriptions of two new species of the genus *Fannia* R.-D. from China. Acta Zootaxonomica Sinica 26(2): 225–228.